Swami Ramanand Teerth Marathwada University, Nanded.

Synopsis of Research topic

"Studies on Nutritional Value and Detection of Antibiotic Residues in Broiler Chicken of Nanded city (M.S.)"

Submitted for

Registration to Ph.D. Degree in Zoology

under the faculty of Science and Technology,

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Abstract of proposed work plan/ problem:

Chicken meat is recommended for consumption by all age groups as it contains significant amount of high-quality and easily digestible protein and a low portion of saturated fat. The nutritional quality of chicken meat is related to various factors such as keeping conditions, feeding treatment, feed composition, transport, and stress before slaughter, etc. However, chicken meat could also become a source of health hazards if it contains excess fats or harmful materials such as toxins or residues of chemical agents like antibiotics. The antibiotic residues in chicken meat can cause human health problems such as imbalance of intestinal microbiota, sensitivity to antibiotics, allergic reactions, bacterial resistance to antibiotics etc. This study aimed to study the nutritional value of chicken meat and also to detect antibiotic residue in Broiler chicken sold in Nanded city.

1. Introduction:

Chicken meat is a commonly available and inexpensive food that is rich in nutrients (Ravindran, 2013). High protein content makes chicken meat an ideal foodstuff for all consumers who need high-quality, easily degradable protein (athletes, children, the elderly) Chicken meat is also a good source of some minerals and vitamins. In 1999, global production of chickens reached 40 billion, and by 2020 this trend is expected to continue to grow, so that poultry meat will become the consumers' first choice (Bilgili, 2002). However, meat could also become a source of health hazards if it contains excess fats or harmful materials such as toxins or residues of chemical agents (Mahgoub et al. 2006). A broad range of antibiotics is used in poultry not only to treat diseases but also to maintain health, promote growth, and enhance feed efficiency (Nisha, 2008). Existence of the antibiotic residues in foodstuff can become hazardous to human being. The antibiotics that have been given to poultry will be deposited in the liver, kidney, muscle, and bones surpassing the Maximum Residue Limit (Sarker, et al. 2018). The use of antibiotics in chickens increases the risk of antibiotic resistance and allergic reactions to antibiotics8 which may eventually become a part of the human diet (Mund et al. 2017). Therefore, the aim of the research is to study the nutritive value of chicken meat, as well as to detect antibiotic residues present in it.

2. Review of Literature and Development in the subject:

Fresh chicken meat and chicken products are universally popular. Gordana et al. (2018) studied nutritional quality of chicken meat and concluded that chicken meat is a source of high quality protein with a relatively low content of fat. Antibiotics are given periodically during the lifetime of the broilers to promote growth and for production by preventing bacterial disease in livestock (Gustafson and Bowen (1997). Since broiler chickens are the largest sources of meat across the world, market demand has put the farmers under continuous pressure to produce chickens in the shortest period time with the maximum output. Since the main consumers of animal products are humans, several serious health problems have been detected in them due to the intake of those animal products which are continuously exposed to antibiotics. Some antibiotics are directly toxic, like chloramphenicol which causes aplastic anemia, while allergic reactions and toxic side effects may have fatal consequences (Popelka et al. 2003).

3. Objectives of Research/ Proposed Hypothesis:

1. To collect broiler chicken meat sold in Nanded city
2. To determine the nutritional composition of broiler chicken meat
3. To detect antibiotic residues and other chemical contaminants in broiler chicken meat

4. Methodology to be adopted:

4.1 Nutrient Analysis:

Moisture Analysis: Moisture analysis will be performed using the AOAC (2006) method. Samples (approximately 2.0 g) will be weighed out into aluminum tins and allowed to dry for 24 h at 100 °C in an air oven. After drying in the oven, the samples will be allowed to cool in a desiccator and then weighed. Loss in weight will be reported as percent moisture.

Percent Ash : Ash will be determined using the ash oven method described in the AOAC (2006) method. Approximately 1.0 g of sample will be placed into a dry, preweighed crucible. The samples will then be placed into a Thermolyne box furnace at 600°C for 24 hours. Samples will be allowed to cool in a desiccator and weighed. Ash will be calculated by loss in weight.

The pH: About 10 g of the meat samples will be homogenised with 50 mL of chilled distilled water, and the pH values were measured with a digital pH meter

Characterisation of Protein Fraction: Protein analysis will be carried out by Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE)

Total Lipid and Cholesterol Determination: Total lipid will be extracted and quantified from 1 g of homogenized sample using the method of Folch et al., (1957) as modified by Bligh and Dyer (1959). Total cholesterol will be determined via gas liquid chromatography using a SPB-1 fused capillary column (30 m x 0.53 mm i.d; Supelco, Bellefonte, PA) with column temperature at 250°C and detector and injector temperatures at 300°C as described by Dinh et al. (2008). Fatty acid analysis Fatty acid methyl esters will be prepared as described by Parks and Goins (1994).

Haemoglobin Content Analysis: Haemoglobin content will be determined according to following Richards and Hultin (2000) and modifications suggested by Maqsood et al. (2015).

4.2 **Extraction of antibiotic from a meat sample**

10 grams of sample will be first crushed and ground in a sterile mortar with the help of a sterile pestle and the 10 ml of phosphate buffer was added. Then it will be mixed by vortexing. The solution will be transferred to centrifuge tubes and centrifuged at 700 rpm for 10 minutes. The clear supernatant will be transferred to fresh glass test tubes and was incubated in an incubator at 37 °C for 30 minutes (Kirubaharan et al. 1999).

Evaluation of the antibacterial activity of chicken meat extract

The test bacterial inoculums (0.5 Mcfarland standards) of *S. aureus* and *E. coli* will evenly be spread on sterile MHA media plates separately with the help of sterile cotton swab. Then the medium will be allowed to dry for 3-5 minutes to allow for absorption of excess moisture. Three wells will be made with the help of a sterile cork borer and filled with extracts (clear supernatant) of gizzard, liver, and muscle respectively by using a micropipette. The plates will then be incubated in an incubator at 37° C for 24 to 48 hrs (Javadi et al. 2011).

Thin Layer Chromatography

This technique will be used to separate non-volatile mixtures. It will be performed on a sheet of glass coated with a thin layer of adsorbent material (i.e. silica gel) as the stationary phase.

The same supernatant sample extracted for the microbiological test will be used for this process. The supernatant will then be filtered with the help of Whatman Filter Paper and funnel. The filtrate will be collected in another clean tube and an equal amount of di-ethyl ether will be added and left at the room temperature for 10 minutes. The final extracts will be carefully poured and collected in a tube.

5. Importance of study/ Society application:

5.1 International status: According to Ingr (1989) meat quality is a term used to describe the overall meat characteristics including its physical, chemical, morphological, biochemical, microbial, sensory, technological, hygienic, nutritional and culinary properties. Chicken meat could also become a source of health hazards if it contains excess fats or harmful materials such as toxins or residues of chemical agents. Mund et al. (2017) observed that common diseases such as typhoid, Mycotoxicosis, *E. coli* infections, Coccidiosis, Salmonellosis, Enteritis, Ascites, Newcastle disease, etc., affect poultry growth and production and have become a factor for the economic losses due to high mortality among the flocks. So the antibiotics are given to chicken. According to this study, among the three different tissue sample liver showed the highest content of antibiotic residue followed by muscles and gizzards. A similar study was done in the Kavre and Kailali districts of Nepal by using the Kit Test method, 22% of the samples were found positive (Raut et al. 2017).

5.2 National Status: Sandip et al. (2021) compared the growth and Haemato-biochemical parameters of Kadaknath and Chabro chickens reared under organic condition. Similarly, Kalita et al. (2018) concluded that certain parameters like total protein, albumin, globulin and uric acid was significantly higher in indigenous chickens of Assam with compare to broiler.

5.3 Significance of the study:

- The results of the study will be helpful for the information on the nutritional value of broiler chicken
- The study will be helpful for the detection of presence of antibiotics and other chemical contaminants present in broiler chicken
- The study will be helpful understanding the health benefits and hazards due to consumption of broiler chicken

6. Proposed work Plan/ Formulation and Structure of Study:

Year-wise Plan of work and targets to be achieved:

1. **First Year:**

- Collection of broiler chicken meat samples from different chicken centres in Nanded city
- Nutritional analysis of broiler chicken meat samples

2. Second Year:

- Nutritional analysis of broiler chicken meat samples
- Detection of antibiotic residues and other chemical contaminants in broiler chicken meat

3. Third Year:

- Detection of antibiotic residues and other chemical contaminants in broiler chicken meat
- Analysis and compilation of data

7. References:

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